

**MOBILE COMMUNICATION SYSTEM FOR  
CONTROLLING SETTING UP A CONNECTION**

**CLAIM TO PRIORITY**

5        This application claims priority from German application  
number 19839016.5 filed on August 27, 1998 and from Patent  
Cooperation Treaty (PCT) application no. PCT/DE99/02696 filed  
on August 27, 1999.

10        **TECHNICAL FIELD**

The invention relates to a method and a mobile communication system for controlling the setting-up of a connection.

**BACKGROUND**

15        Mobile subscribers are able to move freely with their mobile stations even beyond the network boundaries of their home mobile radio network (roaming).\_ However, when a subscriber is roaming into another visited mobile radio network, he cannot easily use call numbers well known to him  
20        from his home mobile radio network such as, for example, service numbers, hotline number, mailbox number, etc. since

he is subject to the numbering plan applicable in the ~~that~~  
network. \_Even if, in principle, it is possible to reach the  
call number in the other network, the mobile subscriber  
usually dials the call number known to him from his network  
5 | in order to initiate the call.\_ However, this procedure is  
unsuccessful so the mobile subscriber must take elaborate  
additional measures.

It is known that mobile communication systems use one or  
more subscriber databases (home location registers), in which  
10 | ~~the subscriber data are in each case stored for each~~  
~~subscriber for registering the mobile subscribers in their~~  
~~home mobile radio network. Since the subscriber is moving~~  
~~between a number of radio coverage areas in the system, he~~  
~~is, in consequence, registered in one or more corresponding~~  
15 | ~~subscriber databases (visited location registers) with the~~  
~~subscriber oriented data depending on his current location.~~  
~~It is known that an updating procedure (location update) is~~  
~~performed for this purpose. These subscriber databases are~~  
~~coupled to mobile switching centers distributed over the~~  
20 | ~~system, which are responsible for controlling the setting up~~  
~~of a connection and for routing the connections from/to the~~

~~mobile stations which are in each case~~ located in their area  
of responsibility because of their current location.

**SUMMARY**

It is an advantage of the present invention to specify a  
method and a mobile communication system for controlling the  
setting-up of a connection and also which enables the  
subscriber to utilize familiar call numbers outside of the  
subscriber's home mobile radio network.

~~It is the object of the present invention to specify a  
method and a mobile communication system by means of which it  
is possible to control the setting up of a connection also  
for the utilization of familiar call numbers by the moving  
subscriber outside his home mobile radio network.~~

~~According to the invention, this object is achieved by  
the features of claim 1 with respect to the method and by the  
features of claim 9 with respect to the mobile communication  
system. Developments of the invention are specified in the  
subclaims.~~

On the basis of the fact that subscriber-oriented data  
of each mobile subscriber registered in his home mobile radio  
network are is stored in at least one subscriber database

and, when the subscriber moves, ~~are~~is entered in a  
corresponding subscriber database in accordance with an  
updating procedure, the subject matter of the invention  
provides that a subscriber number profile with call numbers  
5 generally valid for all registered mobile subscribers is  
stored additionally in the subscriber database of the home  
mobile radio network and, when the respective subscriber  
moves into the visited mobile radio network, is also  
transmitted in the updating procedure for storage in the  
10 corresponding subscriber database. Furthermore, the mobile  
switching center in the visited mobile radio network compares  
the call numbers of the subscriber number profile with the  
called party address for a mobile originated call which is  
initiated with a called party address dialed by the mobile  
15 subscriber, ~~and, when they~~. When the call numbers match, a  
connection is set up to a service control point which  
translates the called party address also transmitted into a  
new called party address ~~and sends it~~. The new call party  
address is sent back to the mobile switching center for ~~the~~  
20 further use in setting-up of a connection.

The subscriber number profile with generally valid call  
numbers for all mobile subscribers registered in the home

network according to the invention has the result that the call numbers familiar to the mobile subscriber can be called up not only in his home network but also in any other network in which he happens to be located, without elaborate

5 | additional measures by the subscriber. ~~He~~ The subscriber  
behaves as if he were in his home network with respect to the dialing of the desired call numbers. The storage of the subscriber number profile applies to all subscribers so that it does not need to be specified, stored and loaded in the  
10 | case of an update for each individual subscriber. The subscriber number profile is automatically ~~also~~ supplied in addition to the subscriber-oriented data with each update of the location due to roaming into another network.

According to an advantageous development of the  
15 | invention, the called party address with the internal network call number format is translated into the new called party address with an international call number format by ~~the~~ a  
service control point. This results in a successful,  
internationally valid identification of the call number by  
20 | the service control point in the connection set-up without the subscriber noticing this or even having had to carry out

measures for this. This call number, which is only valid in the network, automatically becomes an international number.

It is also ~~of advantage~~ advantageous if the generally valid call numbers in the subscriber number profile are optionally stored either with the complete number of call number digits or with an abbreviated number of call number digits and are in each case compared with the corresponding number of call number digits of the called party address.

Storing the abbreviated call numbers offers the advantage of reducing the required storage space in the respective subscriber databases.

According to another development of the invention, a service key and/or a service control point address of the service control point are stored in the subscriber number profile in addition to the generally valid call numbers and are also transmitted. It is thus possible also to supply additional information, which leads to a faster and/or simpler connection set-up by the mobile switching center.

The mobile communication system according to the invention exhibits memory means in the subscriber database of the home mobile radio network for additional storage of a subscriber number profile with generally valid call numbers

for all registered mobile subscribers and control means in the subscriber database for transmitting the subscriber number profile in the updating procedure when the respective subscriber moves into the visited mobile radio network, and  
5 memory means in the corresponding subscriber database for storing the subscriber number profile also transmitted.

Furthermore, the mobile communication system includes control means for comparing the call numbers of the subscriber number profile with a called party address dialed by the mobile  
10 subscriber for a mobile originated call, which is initiated with the called party address, and for setting up a

connection to a service control point when they match, ~~are provided in the mobile switching center of the visited mobile radio network.~~ In addition, the service control point  
15 exhibits control means for translating the called party address also transmitted into a new called party address and for sending the new called party address back to the mobile switching center for ~~the~~ further connection set-up.

The invention is explained in greater detail with  
20 reference to an exemplary embodiment ~~shown in a drawing which~~.

**DESCRIPTION OF THE DRAWING**

Fig. 1 shows ~~the~~ a block diagram of a mobile communication system for controlling the setting-up of a connection.

**DETAILED DESCRIPTION**

The example of Fig. 1 is based on a system according to the GSM Standard but the invention is not restricted to this standard. From the point of view of a mobile subscriber who uses a mobile station (MS) for initiating mobile originated calls and receiving mobile terminated calls, the mobile communication system comprises a home mobile radio network HPLMN and a visited mobile radio network VPLMN. In this arrangement, ~~hean~~ identity of the mobile subscriber is permanently stored with his subscriber-oriented data in a home location register HLR of the home mobile radio network HPLMN for the duration of his registration. Because of his mobility, ~~hethe~~ identity is also stored with his subscriber-oriented data in a visitor location register VLR of the visited mobile radio network VPLMN for the duration of a temporary stay in another radio coverage area. The switching in the radio coverage area is handled by a mobile switching



center MSC, which controls the connection set-up for the calls which can be received and initiated by subscribers or terminals with associated data in the visitor location register VLR. The mobile switching center MSC and the home location register HLR have a control unit CM or, respectively, CON and the home location register HLR and the visitor location register VLR in each case have a memory means MM. The mobile switching center MSC can set up a connection to a service control point SCP of an intelligent network ~~(IN)~~ when an IN trigger is present in the call processing. The service control point SCP has a service logic SL for controlling the IN services.

To control the setting-up of a connection according to the invention, a subscriber number profile R-CSI (roaming CAMEL service information) with generally valid call numbers for all registered mobile subscribers Sub1, Sub2 ... Subn, e.g. No1 = 1234 and No2 = 37367, is additionally stored in the home location register HLR of the home mobile radio network HPLMN in a step (1), and when the respective subscriber moves into the visited mobile radio network VPLMN, also transmitted in the updating procedure LUP (location update) for storage in the visitor location register VLR.

Storage in the two subscriber databases in each case takes place in the memory means MM, the control unit CON of the home location register HLR initiating the reading-out of the memory means MM and the transmission of the subscriber number profile R-CSI in the updating procedure LUP. In the memory means MM of the home location register HLR, further information is preferably stored such as, e.g., a service key (SK) and/or a service control point address (SCP-A) of the service control point SCP. This additional information, which is defined and administered in a generally valid manner for all subscribers Sub1, Sub2 ... Subn stored in the home location register HLR, can also be transmitted in the updating procedure in addition to the subscriber-oriented data.

The generally valid call numbers No1, No2 stored in the subscriber number profile R-CSI are, ~~for example,~~ may be abbreviated call numbers, which are familiar to the subscriber in his home mobile radio network HPLMN. Due to the invention, a certain service (service number) can be used or a mailbox can be called up even in the other network VPLMN, even if a different numbering plan exists there, when an abbreviated call number known to the subscriber is dialed.

The generally valid call numbers No1, No2 in the subscriber number profile R-CSI are optionally stored with the complete number of call number digits or with an abbreviated number of call number digits in the memory means MM.

5           According to the invention, the mobile switching center MSC in the visited mobile radio network VPLMN compares the call numbers No1, No2 of the subscriber number profile R-CSI with the called party address CldPA for a mobile originated call which is initiated by the mobile subscriber with a  
10   message SU (setup) and a dialed called party address CldPA=1234 - for example an abbreviated call number -  
| according to step (2) in the present example. Since a match  
| between the call number No1 and the called party address CldPA, having in each case the digit combination 1234,  
15 | ~~exist~~exists in the present example, this match acts as IN  
| trigger mechanism in the mobile switching center - see step  
| (3) - so that, in consequence, the call is routed from the  
| mobile switching center MSC to the service control point SCP.  
| Routing according to step (4) contains a query message SCP-Q  
20 | with the called party address CldPA=1234 - or, respectively,  
| the abbreviated call number No1=1234 - to the service control  
| point SCP, the service logic SL of which translates the

received called party address into a new called party address  
CldPA\*=+49 172 66666 - see step (5). After that, the service  
control point SCP or, respectively, its service logic SL  
sends the new called party address CldPA\*=+49 172 66666 back  
5 to the mobile switching center MSC for continuing the  
connection set-up - see step (6). In the present example,  
the abbreviated call number CldPA=1234 which arrived at the  
service control point SCP and which only has validity in the  
home mobile radio network HPLMN with an internal network call  
10 number format in this digit combination, was translated into  
a long call number CldPA\*=+4917266666 with an international  
call number format including the country code (+49) and the  
network code (172) which also has validity in the visited  
mobile radio network VPLMN.

15 It is assumed that the subscriber-oriented data for the  
mobile subscriber may also contain service data which  
provide for the utilization of an IN service and thus  
the routing of the call to a service point - possibly a  
different one from the service control points (SCP). In this  
20 case, ~~these~~ the service data ~~are~~ is loaded into the visitor  
location register VLR by the home location register and ~~are~~  
is evaluated by the mobile switching center MSC. Because of

the presence of an IN trigger, the mobile switching center initially sets up the connection to the IN service control point.\_ After this connection has been set up, the call numbers of the subscriber number profile R-CSI are assessed with respect to a match with the called party address CldPA and a further connection is set up according to the above procedure to the service control point SCP shown.

Sequentializing the call processing ensures that a number of contacts to service control points SCP, or, respectively, service logics SL are supported in succession during the connection set-up.\_ As a result, it is advantageously possible to combine an IN service which can be individually used and entered for the mobile subscriber with the IN trigger mechanism according to the call numbers of the subscriber number profile which are generally valid for all subscribers according to the invention.

What is claimed is: